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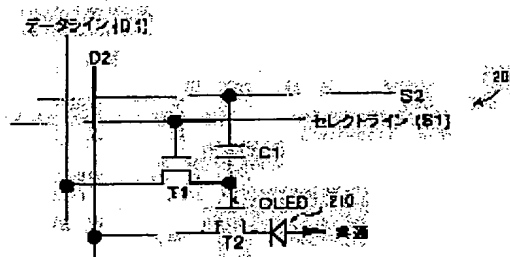
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(54) DISPLAY PIXEL STRUCTURE FOR ACTIVE MATRIX ORGANIC LIGHT EMITTING DIODE (AMOLED), AND DATA LOAD/LIGHT EMITTING CIRCUIT THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a display unit capable of being efficiently displayed at lower voltage and generally more profitable for all types of equipment applying the display unit.

SOLUTION: In this pixel structure used for a display unit using an organic light emitting diode (O-LED) 210, each pixel structure of an array comprises O-LED 210. The structure comprises a circuit part for allowing operation in three basic modes, that is a writing selection mode, a writing non-selection mode and a light emitting mode. Also the structure comprises a circuit part for selecting pixel structure so that data can be written in the pixel structure and a programmed current level indicated by data is added to the O-LED 210, a circuit part for causing non-selection in the pixel structure when data is written in pixel structure of different lines, and a circuit part for giving a programmed current level to the O-LED 20 and light emission in the O-LED 210.



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CLAIMS

[Claim(s)]

[Claim 1] So that it may be the pixel structure for using it for an indicator, it may have a light emitting diode (LED) and a data electrical potential difference can be written in this pixel structure When the pixel structure which it has a means for causing that this pixel structure is chosen, and said data express the programmed current level which should be given to LED, and is in a different line has data written in it, Pixel structure equipped with the means for applying the this programmed current level to LED, in order to have a means for causing that this pixel structure is made un-choosing and to make LED emit light.

[Claim 2] Pixel structure according to claim 1 further equipped with the means for supervising this current that flows during write-in programming at LED, and the feedback means for acquiring the current which adjusts a data electrical potential difference during write-in programming, and is desired.

[Claim 3] Said means for causing that pixel structure is made un-choosing is pixel structure according to claim 1 which intercepts alternatively the current which lets pass and flows to this LED while carrying out write-in programming of other pixel structures.

[Claim 4] Said means for causing that pixel structure is chosen is the pixel structure containing two selection lines and one transistor which are controlled independently according to claim 1.

[Claim 5] Said means for causing that pixel structure is un-chosen is the pixel structure containing two selection lines controlled independently and one transistor according to claim 1.

[Claim 6] Said means for adding is the pixel structure containing a capacitor and a transistor according to claim 1.

[Claim 7] It is the array of the pixel structure combined with the digital current source. Each pixel structure They are the 1st and 2nd data lines, the 1st and 2nd selection lines, and the 1st and 2nd transistors. Each transistor The capacitor for storing the potential which has a source electrode, a gate electrode, and a drain electrode, and expresses the programmed current level, Have an organic light emitting diode (O-LED), and the source electrode of this 1st transistor is combined with this 1st data line. The source electrode of this 2nd transistor is combined with this 2nd data line. It is combined with the 1st selection line. the gate electrode of this 1st transistor — this — the gate electrode of this 2nd transistor — this capacitor — going — this — the array of the pixel structure where it is combined with the 2nd selection line and the drain electrode of this 1st transistor, and the drain of this 2nd transistor is combined with this O-LED.

[Claim 8] The array of the pixel structure according to claim 7 further equipped with the means for being combined with these 1st and 2nd data lines, and driving each pixel structure in this array in write-in selection mode, the mode in which write-in it does not choose, and the three modes containing luminescence mode.

[Claim 9] It is the array of the pixel structure combined with the digital current source. Each pixel structure Have the 1st and 2nd data lines, and it has the 1st and 2nd selection lines. It has the 1st and 2nd transistors. Each transistor A source electrode, Have a gate electrode and a drain electrode, have a capacitor, and it has organic light emitting diode (O-LED). The source electrode of this 1st transistor is combined with this 1st data line. The source electrode of this 2nd transistor is combined with this 2nd data line. It is combined with the 1st selection line. the gate electrode of this 1st transistor — this — It is combined with the 2nd selection line and the drain electrode of this 1st transistor. the gate electrode of this 2nd transistor — this capacitor — going — this — It is combined with this O-LED and the drain electrode of this 2nd transistor is combined with these 1st and 2nd data lines. It has a means for driving each pixel structure in an array in write-in selection mode, the mode in which write-in it does not choose, and the three modes containing luminescence mode. This write-in selection mode So that the programmed current level may be attained in this pixel structure It causes that this pixel structure is chosen and said programmed current level expresses the brightness which should be displayed on this O-LED and which is desired. This mode in which write-in it does not choose When the pixel structure in a different line has data written in it, It is the array of pixel structure which it causes [array] driving this luminescence mode on the current level by which this O-LED was this programmed, and makes this pixel this emit light by causing that this pixel structure is un-chosen.

[Claim 10] So that it may be an approach for driving the pixel structure for using it as an indicator including organic light emitting diode (O-LED) and data can be written in this pixel structure When the pixel structure which it causes that write-in selection of this pixel structure is made, and said data express the programmed current level which should be applied to this O-LED, and is in a different line has data written in it, How to apply the this programmed current level to this O-LED, and cause [causes that this pixel structure is made un-/ write-in / choosing, and] that this O-LED emits light.

[Claim 11] For both the selection line, this pixel structure is an approach according to claim 10 made by the logic high when write-in selection of this pixel structure is made including two selection lines.

[Claim 12] For both the selection line, this pixel structure is an approach according to claim 10 made by the logic low when this pixel structure is un-[write-in] chosen including two selection lines.

[Claim 13] It is the approach according to claim 10 by which other selection lines are made by the logic high while one selection line is made by the logic low, when, as for this pixel structure, this pixel structure emits light including two selection lines.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Roughly, about pixel structure, in more detail, this invention has the three modes of operation, and this invention relates to the pixel (configure) structure formed using organic light emitting diode (O-LED).

[0002]

[Description of the Prior Art] The technique of an indicator (display) has spread round all the situations of today's everyday life on the dashboard of an automobile, a laptop computer, and a wrist watch from television. At the current time, the cathode-ray tube (CRT) has spread through drop application in 10-40 inch (diagonal line) drop size. However, CRT has many un-arranging including weight, lack of robustness, cost, and very high driver voltage being required.

[0003]

[Problem(s) to be Solved by the Invention] Recently, a passive matrix liquid crystal display (LCD) and an active-matrix liquid crystal display (AMLCD) have come to spread in the drop application of the middle range for those use by the laptop computer. AMLCD is becoming important also for [for smaller pixel size] a big graphic display machine. However, the main disadvantageous profits of AMLCD are requiring the tooth-back (back) light to which the size and weight of an indicator are made to increase substantially. Moreover, since backlighting is continuously applied even for the pixel of an OFF state, it draws the effectiveness which decreased.

[0004] Other approaches are defoamer bull mirror drops (DMD:deformable-mirror display) which set a foundation on a single-crystal-silicon technique. In this approach, the mirror (micro-machined) structure by which micro processing was carried out is doubled with the reflecting mode or the dispersive mode in bearing depending on whether it is written in the cel to which logic "1" or logic "0" corresponds (orient). A DMD drop must operate in the reflecting mode. For this reason, optics comes out [become more complicated and / a transparency (transmissive) drop or an emission (emissive) drop] in a small way or is not efficient. In addition, it is similar with AMLCD, and DMD needs the external light source and, for this reason, they are low larger effectiveness than a self-luminescence drop.

[0005] A field emission display machine (FED) may also be taken into consideration for much application. However, FED has the demand corresponding to it of having the leakage current with low the thing of inconvenient many with which CRT is associated, and the cathode electrical potential difference exceeding especially 100 volts being need and thin film transistor (TFT). FED has the comparatively low luminous efficiency covering the whole for use of the effectiveness in which "low-battery" fluorescent substances decreased in number, and high-voltage control voltage.

[0006] Finally, other types of an indicator and an active-matrix light emitting diode (AMEL) indicator emit light by passing a current through a light emission ingredient. In the case of EL, a light emission (for example, PN junction is formed from inorganic semiconductor materials, such as silicon or gallium arsenide) inorganic material lets an alternating current (AC) pass. A light emission inorganic material is arranged so that a dielectric may exist in the either side of the luminescent material. Since an electrical potential difference comparatively high for the existence of a dielectric produces sufficient light from luminescent material, it is required. A comparatively high electrical potential difference is among 100-200 volts typically.

[0007] Use and other factors of AC electrical potential difference restrict the effectiveness of a general drop.

[0008] Moreover, about the stability of an inorganic LED drop, the brightness of a light emission ingredient is saturated with applied voltage, after changing [quick] from OFF to ON. Supposing a drop operates in "turning on enough" on and the mode "turned off enough", all shifts of the transition electrical potential difference accompanying time amount also have only very slight **** on brightness.

[0009] these un-arranging [of various drop techniques] — an alignment — stopping — if — a lower electrical potential difference — needing — more — efficient — and probably, a better type of a general more advantageous drop is desired to all the types of drop application.

[0010]

[Means for Solving the Problem] This invention includes the pixel structure for using it on the display which uses an organic light emitting diode (O-LED). Each pixel structure of a whole array contains organic light emitting diode (O-LED). In addition, the structure is in the write-in selection mode in which the structure is in three fundamental modes, the mode in which write-in it does not choose, and luminescence mode, and contains the circuitry part for

permitting operating. This, therefore its structure so that data can be written in pixel structure The circuitry part for causing that pixel structure is chosen is included. When it has data with which the pixel structure which said data show the programmed current level which should be applied to O-LED, and is in a different line is written in the structure, The circuitry part of the ** sake which applies the programmed current level to O-LED including the circuitry part for causing that the pixel structure is made un-choosing, and causes luminescence to O-LED is included.

[0011]

[Embodiment of the Invention] This invention is understood by best from the continuing detailed explanation, when it relates with an accompanying drawing and reads.

[0012] A good alternative is [to the indicator technique described in the column of the technical problem which the Prior art of this application and invention solve, and is made into ** rather than] an active-matrix organic light emitting diode (AMOLED) indicator. In the case of an AMOLED drop, it is used in order that an organic material may form LED rather than an inorganic material. The instantiation which uses an organic material in order to form LED is found out by U.S. Pat. No. 5,142,343 and U.S. Pat. No. 5,408,109, and these both sides are included by referring to here. The typical example of O-LED used with this invention is described by the detail below with reference to drawing 1.

[0013] Directly, about O-LED, a direct current (DC) is passed through an organic diode ingredient, and light is generated. Conduction is the forward direction. increasing with time amount finds out the electrical potential difference needed for a light emission ingredient in order to emit given optical level through an experiment — having — saturation with substantial this, therefore transition electrical potential difference to "ON" from "OFF" — nothing — time amount — increasing . however, it was found out that given optical level (brightness) was comparatively alike, and is also stable about the current which passes an organic diode ingredient. In addition, since threshold voltage is sensitive to a process (processing), for the process fluctuation in an O-LED manufacture process, the fixed small driver voltage level is not effective, and may be carried out.

[0014] This invention includes the configuration (configuration) of an O-LED pixel programmable (programmable) and independent of either the shift of the transition electrical potential difference of a pixel, or the shift of the threshold voltage in a transistor with a current.

[0015] The technique of this invention includes a separate current source programmable in digital one to each train (column) Rhine of a pixel array. Not only two selection lines S1 and S2 but two data lines D1 and D2 are offered to each pixel of the 1st typical example of this invention. The combination of a data line and a selection line offers the multimode actuation containing write-in selection mode, the mode in which write-in it does not choose, and luminescence mode of a pixel. In order to realize each in the mode, two transistors and one capacitor are formed so that it may act on an O-LED pixel list with a data line and a selection line (operatively) (configure). The detail of the configuration of an O-LED pixel and the mode of operation are described below with reference to a drawing. Although the typical example of this invention is described in relation to O-LED, it is also expected that this invention can be used with other similar drop elements called LED.

[0016] In the case of an AMOLED drop, since light is generated, DC current is passed through a diode ingredient. increasing with time amount finds out the electrical potential difference needed in order to emit given optical level — having — saturation with substantial this, therefore transition electrical potential difference to "ON" from "OFF" — nothing — time amount — increasing . however, it was found out that boiled given optical level (brightness) comparatively and it is also stable to the current passed through a light emission ingredient. For this reason, if a desirable pixel is designed, in order to emit given brightness like [in the case of the AMEL drop of a conventional type], a fixed current can be supplied to a light emission ingredient, and a condition can be attached by the specific current rather than a specific electrical potential difference (programmed).

[0017] (Typical example of this invention) Before describing a pixel drive technique in a detail, the structure of O-LED is described. An O-LED ingredient has the important description of this invention in the fact of attaining the logic high (High) value of brightness in low driver voltage. In addition, the property of a current drive of an O-LED ingredient decreases remarkably a demand of the leakage current on an active-matrix drive transistor, and, for this reason, this invention is suitable for the glass substrate of low cost. O-LED adopted by this invention begins to emit light by about 2-10 volts typically.

[0018] Generally, the process for formation of the whole indicator which used O-LED contains ** which accumulates 3 (for color display machines) color shutter which forms some steps and 1 polish recon active-matrix circuitry part (circuitry), and which accumulates an O-LED ingredient on 2 active-matrix array and which carries out assembly of the panel which carried out 4 completion, and is tested.

[0019] As mentioned above, the 1st step in a typical manufacture process is formation of an active-matrix circuitry part. For this invention, a polish recon thin film transistor (TFT) technique is adopted. The desirable circuitry part which should be formed is described by the detail below with reference to drawing 2 and drawing 4.

[0020] In a process, the 2nd step includes deposition of the LED ingredient to an active-matrix array top.

[0021] Drawing 1 shows typical instantiation of suitable O-LED manufacture, in order to use it with this invention. Reference of drawing 1 deposits and carries out pattern formation of a transporence conduction electrode called an indium stannic acid ghost (ITO) to the 1st. Deposition of a hole transportation layer, the doped emission layer, and the tooth-back layer of AlO₃ follows this. An array is completed by the deposition of a MgAg up electrode which results in "a stack (stack, laminating)" of O-LED shown in drawing 1.

[0022] For this invention, a chart 1 shows the typical thickness for each class of an O-LED stack.

一覧表 1

層	厚さ
透明伝導電極	約 750 オングストローム
輸送層	約 800 オングストローム
ドーパされた放出層	約 400 オングストローム
背面層	約 400 オングストローム
上部電極	約 2000 オングストローム。

[0023] Finally, an indicator is packed and tested. Although not shown, packaging contains the means and covering protective coat for making the reliable connection with mechanical support of a drop, and an external electrical circuit.

[0024] Remarkable effectiveness was proved [O-LED]. Luminous efficiency also has 15 l/w. The value of the brightness of 2000 cd/m² is the operating voltage below 10 volts, and was attained with the current density of 20 mA/cm². The order of the higher magnitude of brightness was measured in higher current density.

[0025] Drawing 2 shows the circuit diagram of the 1st typical example of the O-LED pixel structure where this invention was followed. Since it is expected that each pixel structure in the array (for example, 1024x1280) of a given pixel is the same, only one pixel structure is described. The configuration of the pixel shown in drawing 2 is programmable with a current, and independent of either of the shifts of the transition electrical potential difference of O-LED, or the threshold voltage of a transistor.

[0026] As shown in drawing 2, the pixel structure 200 includes O-LED210, two transistors T1 and T2, two Rhine D1 and D2 run in the direction of data, and two Rhine S1 and S2 run in the selection direction. In addition, the pixel structure 200 contains a capacitor C1. By the typical example, each transistor contains the source, the gate and a drain, and a corresponding electrode.

[0027] The source electrode of the 1st transistor T1 is connected to the detail to data electrical-potential-difference Rhine D1. The source electrode of the 2nd transistor T2 is connected to data current Rhine D2. The gate electrode of the 1st transistor T1 is connected to the 1st selection line S1. The gate electrode of the 2nd transistor T2 is connected to the 2nd selection line S2 via the capacitor C1. The drain electrode of the 1st transistor T1 is not only connected to the storing capacitor (C1), but is connected to the gate electrode of the 2nd transistor T2.

[0028] As mentioned above, the combination of a data line and a selection line offers the multimode actuation containing write-in selection mode, the mode in which write-in it does not choose, and luminescence mode of a pixel 200. Each in the mode is described with reference to drawing 2 and drawing 3 below. Drawing 3 shows the timing chart about the mode of the typical actuation used with the O-LED pixel of drawing 2 here.

[0029] If their eyes are turned to write-in selection mode the 1st, in order to write in an intensity level into predetermined current level (I1) and this reason, and a pixel, a transistor T1 flows via the selection line S1. As a result, the electrical potential difference on the 1st data line D1 lets a transistor T1 pass, and is applied to the gate of a transistor T2. If the electrical potential difference applied to the gate of a transistor T2 is increased, a transistor T2 flows and it permits that the internal impedance decreases continuously until it reaches the current level I1 in data current Rhine D2, and the current level I1 is applied to O-LED210.

[0030] In write-in selection mode, a select signal S2 is held at the potential of a logic high.

[0031] The current level I1 which data current Rhine D2 is connected to O-LED210 through the transistor T2, therefore was attained flows through both a transistor T2 and O-LED. A shift will be compensated by the increment or reduction of an electrical potential difference which was accumulated in the both ends of a capacitor C1, and was added to the gate of a transistor T2 if the shift of the threshold voltage of a transistor T2 or the transition electrical potential difference of O-LED210 exists. In this way, even if any shifts in either O-LED or the transistor T2 and both operating characteristics exist, it has only **** inadequate for the brightness of this, therefore a pixel on the current which passes along O-LED.

[0032] The detailed timing for write-in selection mode, the mode in which write-in it does not choose, and luminescence mode is illustrated by drawing 3. If drawing 3 is referred to, the write-in selection mode which is the 3rd period on a timing chart will require that both selection lines should be logic highs. That is, the 1st selection line S1 becomes a logic high, and it flows through a transistor T1, and permits that the 2nd selection line S2 for none other than the line (that particular row) also becomes logic yes (namely, write-in selection mode), and this flows through a transistor T2.

[0033] However, about the mode in which write-in it does not choose, the 2nd selection line S2 for all other lines is made by the logic low (Low) (namely, mode in which write-in it does not choose). In this way, the 2nd selection line S2 is used in order to make all T2 transistors on the line of an array in which data are not written un-flowing. As shown in drawing 2, this is attained by combining the 2nd selection line S2 with an are recording terminal through a capacitor C1. When the selection line S2 is a logic low, to the mode in which write-in it does not choose, are concerned, there is nothing to the potential accumulated in the capacitor C1, the signal of the gate of a transistor T2 becomes a logic low, and it ensures that a current does not pass through a transistor T2 or O-LED210. Therefore, the current detected on data current Rhine D2 is flowing only into selected O-LED, and is not flowing into other pixels in alignment with a train.

[0034] As shown in drawing 3, the 1st selection line S1 is made by the logic low, and the inside of luminescence

mode makes a transistor T1 un-flowing by it. The 2nd selection line S2 is made by coincidence at a logic high. The combination of the logic high potential on the selection line S2 and the potential in which it was stored on the capacitor C1 drives the gate of a transistor T2 on the adjusted level (programmed). With this way, O-LED is that programmed current (programmed) level (that is, it was programmed in write-in selection mode like), or emits light by brightness. Moreover, fixed control of a data line D2 is performed by the inside of luminescence mode so that it may be described with reference to drawing 4 below.

[0035] Since it needs to program the pixel structure 200 on specific current level, it has been developed in order that a peculiar current generating circuit may connect with typical pixel structure (INTAFEISU [interface and]). Drawing 4 shows the circuit diagram of the typical current generating circuit 400 where it is suitable to use it with the O-LED pixel structure of drawing 2.

[0036] When drawing 4 is referred to, data lines D1 and D2 are the same data lines as what was shown in drawing 2. The closed constant current loop formation containing the pixel of the selected line can be formed by combining data lines D1 and D2 from the current generating circuit 400 of drawing 4 to the data line of the pixel structure of drawing 2 as shown.

[0037] Transistor T3-T5 are combined with juxtaposition so that drawing 4 may see. Each of a transistor which expresses by putting the programmed digital voltage level together (collectively) receives an input on the gate. However, since the demanded programmable current value is generated, each of a transistor carries out a serial to a weighting **** capacitor appropriately, and is combined, respectively. The output with which the capacitor (C [2] 2 and 0.5C [2 and] 0.25C) was combined is combined not only with the gate of a transistor T6 but with the source of a transistor T8. A transistor T8 is used in order to control the electrical potential difference on data current Rhine D2 in luminescence mode. The current which was adopted in order for connection with T6 to complete a closed loop, then was supplied on data current Rhine D2 is controllable.

[0038] In order to write data in a pixel at a detail, the program digital voltage level G1 - G3 are given to transistor T3-T5, and the inclination (ramp) (R1) of a negative electrical potential difference is connected to the source of transistor T3-T5. the rate of change of an electrical potential difference [as opposed to time amount about an inclination R1] — effective capacity twice ($C \times dV/dT$) — it is carried out and the peculiar current level combined with D2 is set up. It comments on effective capacity being based on a mass of capacity value (namely, C [2] 2 and 0.5C [2 and] 0.25C) of each capacitor combined via each transistor. Ideally, maintenance of the voltage level on data current Rhine D2 will be carried out soon at touch-down potential. It is because this will be set to the luminescence voltage level on data current Rhine D2. (In luminescence mode, the signal L1 of a logic high combines data current Rhine D2 with touch-down potential through a transistor T8).

[0039] About data electrical-potential-difference Rhine D1, a transistor T6 and a transistor T7 amplify the electrical potential difference which formed the inverter and was offered according to the current source on data current Rhine D2, and this reversed voltage level is connected to data electrical-potential-difference Rhine D1. It is increased by the electrical potential difference on data electrical-potential-difference Rhine D1 through the inclination R2 of a further forward electrical potential difference, and the "bootstrap" effectiveness of a capacitor C3. This circuit reaches the equilibrium condition which O-LED210 drives according to the current specified and programmed by signals G1 and G2 and G3.

[0040] As mentioned above, fixed control of a data line D2 is performed in luminescence mode. In a detail, since it has data current Rhine D2 in touch-down potential in luminescence mode, a transistor T8 flows. In order that a transistor T8 may deal with all the currents that pass along all O-LED connected to the specific data line, it comments on a transistor T8 being a comparatively big transistor.

[0041] According to the example shown in drawing 4, working, the typical current on D2 is 1microampere in a write mode, and it is 1mA in luminescence mode. Moreover, the electrical potential difference in the source of T8 is 1 volt. The typical electrical potential difference on D1 is 8v in a write mode, and is "with no interest (don't care)" at luminescence mode.

[0042] The combination of the pixel structure 200 and the current generating circuit 400 makes it possible to design a high definition O-LED drop with a long life in spite of the instability of either good gray-scale homogeneity, LED or TFT. Since a circuit 400 drives polish recon and an amorphous silicon AMOLED drop, it comments on it being well suitable especially.

[0043] Drawing 5 shows the circuit diagram of the 2nd typical example of the O-LED pixel element according to this invention. The pixel structure 500 shown in drawing 5 is similar with the structure shown in drawing 2, and includes multimode actuation. However, between the pixel structure 200 and the pixel structure 500, some differences exist so that it may be predicted. For example, the pair of the data line of drawing 2 and a selection line was transposed to the single data line and the single selection line in the pixel structure shown in drawing 5.

[0044] When their eyes are turned to drawing 5, the pixel structure 500 includes O-LED510, two transistors T1 and T2, one Rhine D1 run in the direction of data, and one Rhine S1 run in the selection direction. By the typical example, each transistor contains the source, the gate and a drain, and a corresponding electrode., it is similar to the pixel structure 200, and the pixel structure 500 contains the capacitor C1 with which the potential which determines the luminescence level of a pixel is stored in level. The source of the 1st transistor T1 is connected to the data line D1. The source electrode of the 2nd transistor T2 is connected to the data line D1. The gate electrode of the 1st transistor T1 is connected to the selection line S1. The gate electrode of the 2nd transistor T2 is connected to the selection line S1 via the capacitor C1. The drain electrode of the 1st transistor T1 is not only connected to the are recording capacitor C1, but is connected to the gate electrode of the 2nd transistor T2.

Furthermore, the switching power line is altogether combined with the gate of a transistor T2, the drain of a transistor T1, and the capacitor C1 through the capacitor C2.

[0045] Like actuation of the pixel structure 200, the combination of a data line and a selection line offers multimode actuation of the pixel 500 containing write-in selection mode, the mode in which write-in it does not choose, and luminescence mode.

[0046] About write-in selection mode, the pixel structure 200 makes a single selection line a logic high with the pixel structure 500 to having required that both selection lines should be made by the logic high. It is similar with such, then making both the selection line within the pixel structure 200 into a logic high, and the terminal of a capacitor C1 combines with a logic high. And if it is made such again, a transistor T1 will flow and the pixel structure 500 will be put on a write mode. At this point, the current desired is impressed on a data line D1 on the occasion of an attempt in order to drive a pixel 510. However, the current from a data line D1 is passed to the gate of a transistor T2 through a transistor T1 until a transistor T2 fully flows. The gate of a transistor T2 reaches sufficient electrical potential difference, and reaches promptly at the equilibrium point which conducts the current desired through a transistor T2. If this point is reached, the pixel structure 500 will be then programmed on the current level desired. It is because the potential with a selection line S1 and capacitor C1 top put together conducts the programmed current, so the gate of a transistor T2 is held to sufficient potential.

[0047] When the selection line S1 is made by the logic low about the mode in which write-in it does not choose, a transistor T1 is made un-flowing, and the same negative deviation as having been generated in the pixel structure 200 arises on C1, and it makes switch-off unconditionally every pixel which is not chosen.

[0048] About luminescence mode, the selection line S1 is made by the logic high, and D1 is made by the logic low. In addition, a switching pulse builds a shunt to a current source, and a data line is combined with the source of action potential. A switching pulse connects the source of action potential to a capacitor C2 at coincidence. The logic high level on the charge accumulated in the join of capacitors C1 and C2 and the selection line S1 makes it make it conduct only the current by which the transistor T2 was programmed through O-LED510. The gate of T2 is returned to the value near the current programmed in write-in selection mode by it.

[0049] According to the example shown in drawing 5, the current on typical D1 in a write mode is 1microampere working, and the inside of luminescence mode is 1mA. Again, the typical electrical potential difference on D1 is 8V in a write mode.

[0050] Although not described by the detail, the additional example of alternative pixel structure expected is shown in drawing 6 -9. This contractor that gained this indication will recognize how the actuation and the current generating circuit of drawing 4 where the example described in relation to drawing 2 and 5 was described give, and each typical example operates with ****. Depending on a specific example, the current generation source 400 may need trifling deformation, in order to measure the facilities of the need for interconnect and timing.

[0051] Drawing 6 shows the circuit diagram of the 3rd typical example of the O-LED pixel element according to this invention to a detail. Directly, a data line and a selection line are operated in order to install the potential relevant to the programmed current level on C1. Then, in luminescence mode, the stored potential drives the gate of a transistor T2 on proper level, and it permits that the proper amount of a current passes O-LED610.

[0052] Drawing 7 shows the circuit diagram of the 4th typical example of the O-LED pixel element according to this invention. Directly, transistors T1 and T2 and T3 are manufactured using a PMOS technique so that drawing 7 may see. Not only a data line but a selection line and a current source are operated in order to set up the potential relevant to the programmed current level on C1. In luminescence mode, the stored electronegative potential drives the gate of a transistor T2 on proper level, and it permits that the proper amount of a current passes to O-LED710. In addition, when this device flows through the pixel structure 700 including the reset mechanism in the format of T3, it causes ***** to which the potential stored on C1 discharges.

[0053] Drawing 8 shows the circuit diagram of the 5th typical example of the O-LED pixel structure where this invention was followed. The 5th typical example programs in a similar way. However, this example is suitable only to a smaller drop, excluding [therefore] frame are recording.

[0054] Drawing 9 shows the circuit diagram of the 6th typical example of the O-LED pixel structure where this invention was followed. It is similar with the example of drawing 7, and this example adopts a PMOS transistor. Directly, a data line and a selection line operate that the potential relevant to the programmed current level should be set up on C1 by which one electrode is grounded in this example. Then, in luminescence mode, the stored potential drives the gate of a transistor T2 on proper level, and it permits that the proper amount of a current passes O-LED910 from Vdd.

[0055] Also although this invention should be illustrated with reference to a specific example here and it describes it, this invention is not having what should be restricted to the shown detail meant. Rather, various deformation in a detail may be made at the field of the equal object of a claim, and within the limits, without separating from the pneuma of this invention.

[0056]

[Effect of the Invention] As explained to the detail above, by the approach for driving the array of the pixel structure concerning this invention, and pixel structure, and pixel structure, on a lower electrical potential difference, it is more efficient and the better type of a general more advantageous drop can be offered to drop application.

[Translation done.]

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(54) 【発明の名称】
アクティブマトリックス省電力ディスプレイ（AMOLED）の表示ピクセル構造とそのための
データロード／駆動回路

【57】(特)

【解説】 より低い電圧を必要とし、より効率的で、安価な銅芯の金タイプに対して一般的により有利であるが、示差を増大する。

[illegible]